

## COMMUNICATING APPARATUS

## BACKGROUND OF THE INVENTION

The present invention relates to a communicating apparatus for a telephone speech conducted via an external telephone connected to a personal computer.

It is possible today to achieve a telephone call from a personal computer (PC) in which an application software of telephone functions is installed. Moreover, image data can also be directly transmitted from a personal computer in which an application software of facsimile communications is loaded.

Most application programs of this type include a telephone directory function. Namely, in a case a telephone and facsimile numbers of a communication partner are beforehand registered to the directory of the application software, it is possible to automatically transmit the telephone or facsimile number to the partner only by indicating the partner in the directory list. Additionally, also when an external telephone is linked with the computer, the user desires to conduct a telephone call via the telephone book in many cases. After the directory is opened and the telephone call is established through a dialing operation, the call is carried out via the external telephone. Therefore, other operations can be accomplished by the computer.

Moreover, when a facsimile transmission is achieved to send a manuscript, it will be more efficient depending on cases that the telephone directory is opened only to dial the call number of the partner and the contents of the manuscript are actually read and transmitted by an external facsimile device.

However, in the conventional method above, when conducting a call, the user is required to make a search for the telephone directory application in the computer and to initiate the application. When it is desired to immediately make a telephone call, the operation is troublesome and annoyance for the user. In some computer applications, when using the external telephone, the user is required to set the external telephone to an off-hook state so as to set the computer to an on-hook state. This leads to a drawback that the operation is bothersome and the telephone set can be used only by those who are versed in the operation technique.

## SUMMARY OF THE INVENTION

It is therefore an object of the present invention, which has been devised to remove the problem above, to provide a communication apparatus for use with external communication terminals such as external telephones and facsimile facilities in which the user can immediately conduct a visual check of the telephone directory without conducting the troublesome initiating operation.

To achieve the object above in accordance with the present invention, there is provided a communicating apparatus comprising an interface unit for establishing connection to a personal computer, an off-hook detecting unit for detecting an event that a telephone line is set to an off-hook state at initiation of communication, and a control unit for transmitting information of the detection from the off-hook detecting unit to a directory application initiation request unit integrally included in the personal computer. Thanks to this configuration, the troublesome operation and knowledge conventionally required for the telephone call from an external telephone using a personal computer become unnecessary. Namely, with the provision of this communi-

cating apparatus, the telephone call can be easily achieved without any particular knowledge.

In accordance with another aspect of the present invention, there is provided a communicating apparatus comprising an off-hook detecting unit for detecting an event that the telephone line is set to an off-hook state at initiation of communication and outputting therefrom information of the detection, a bell signal detecting unit for detecting a bell signal received from the telephone line and outputting therefrom information of the detection, a caller information detecting unit for detecting a caller telephone number notified to a call receiver by a caller telephone number notification service, and interface unit for controlling a serial communication with a personal computer. The central control unit transmits information of the detection from the off-hook detecting unit and the bell signal detecting unit to a directory application initiation request unit incorporated in the personal computer and information of a partner detected by the caller information detecting unit to the personal computer.

## BRIEF DESCRIPTION OF THE DRAWINGS

The objects and features of the present invention will become more apparent from the consideration of the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a diagram schematically showing a configuration of an embodiment of the communicating apparatus in accordance with the present invention;

FIG. 2 is a perspective view showing an appearance of the communicating apparatus connected to a personal computer.

FIG. 3 is a diagram showing constitution of a line control unit of the communicating apparatus;

FIG. 4 is a flowchart showing a control procedure of a call issuing or originating operation in the embodiment;

FIG. 5 is a flowchart showing a control procedure of a call terminating operation in the embodiment; and

FIG. 6 is a flowchart showing a control procedure of a call terminating operation in another embodiment of the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, description will be given of an embodiment in accordance with the present invention.

FIG. 1 shows in a block diagram the configuration of an embodiment of the communicating apparatus including an off-hook information detector and a call originator information detector in accordance with the present invention, FIG. 2 shows an appearance of the apparatus operated in connection with a personal computer, FIG. 3 shows in a circuit diagram the structure of a line controller of the communicating apparatus, and FIGS. 4 and 5 are flowcharts showing operation of the apparatus.

The constitution of FIG. 1 includes a communication network 1 through which the communicating apparatus of the embodiment communicates with other terminals and a line controller 2 to conduct functions such as a function to establish interface for the network 1. The controller 2 includes an off-hook detecting unit 2a to detect at initiation of a communication that the telephone line is set to the off-hook state and a bell signal detecting unit 2b to detect a bell signal received via the network 1. The controller 2 further achieves various functions such as an impedance matching function with respect to the network 1, a signal

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amplifying function, and a two-wire to four-wire converting or transforming function.

Moreover, the embodiment includes a personal computer (PC) interface 4 for the connection with a personal computer 8 and a modem 5 to connect thereto an external data communicating device 30, or an external facsimile apparatus, or the like for data communication.

The system further includes a caller identifier (ID) detecting unit 6 to detect a caller's telephone number notified to the receiver through an originating telephone number notification service. Specifically, the unit 6 extracts telephone number information from signals demodulated by the modem 5. There is also included a central control unit 7 to control the off-hook detector 2a, the modem 5, the caller ID detector 6, and the PC interface 4 linked with personal computer 8. The central control unit 7 supervises these units in accordance with a procedure shown in the flowcharts of FIGS. 4 and 5 to resultantly transmit off-hook information and caller information to the computer 8. The central control unit 7 includes a storage 7a.

The line controller 2 will be described by referring to FIG. 3. In the diagram, 16a, 16b, and 17 respectively indicate a chip wire, a ring wire, and a rectifier. A photo-interrupter 18 is disposed in the off-hook detector 2a. When an external telephone or the like is set to an off-hook state to lower a voltage between the chip wire 16a and the ring wire 16b of the telephone line, off-hook information is outputted to the output terminal hook of the photo-interrupter 18 to be sent to the central control unit 7. A photo-interrupter 19 is also arranged in the bell signal detector 2b. When a bell signal is received from the network 1, a pulse wave is outputted to the output terminal bell to be delivered to the central control unit 7. A transformer 20 interrupts a direct current and to conduct a two-wire/four-wire conversion. A receiver amplifier 21 is installed in a receiver-side signal path, and a sender amplifier 22 is disposed in a sender-side signal path.

A microphone 24 and a loudspeaker 25 allow a user to conduct telephone speech without using hands. An amplifier 26 amplifies a signal outputted from the microphone 24 and an amplifier 27 causes the speaker 25 to sound. A jack 28 connects a handset to the system and a switching unit 29 establishes and changes connections of signal paths between the receiving and transmitting sides.

As can be seen from FIG. 2, the communicating apparatus 3 of the embodiment is coupled with the personal computer 8 in which telephone directory application software is loaded. The PC interface of the apparatus 3 is linked with a serial interface of the computer and hence the apparatus 3 can communicate information with the computer 8 in a serial communication. A liquid-crystal display 15 is arranged in the apparatus 3 and a display 8a is integrally disposed in the computer 8.

In FIG. 1, an application (APL) initiation request unit 9 operates in the computer 8. The unit 9 continuously monitors an event from the off-hook detector 2a of the apparatus 3 in accordance with the present invention.

The computer 8 includes a hard disk device 10. Information stored in the device 10 can be displayed on the display 8a. FIG. 1 also shows a display example 11 of a directory window of the directory window application software initiated by the request unit 9, a display example 12 of caller information by the software at call termination, and a display example 13 in which the user inputs a memo during a speech.

An external telephone set 14 allows the user to conduct speech by phone. The telephone set 14 is connected to the

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chip and ring wires 16a and 16b in a parallel fashion. When the telephone 14 is set to an off-hook state, the voltage between the chip and ring wires 16a and 16b is reduced.

Referring next to the flowcharts of FIGS. 4 and 5, description will be given of the operation of the communicating apparatus constructed as above in accordance with the present invention.

First, referring to FIG. 4, description will be given of an operation to originate call. The application initiation request unit 9 appropriately monitors the serial interface of the computer 8 to receive an off-hook event from the off-hook detector 2a (step S1).

At the same time, the detector 2a continuously makes a check to determine whether or not the external telephone 14 is set to an off-hook state (step S2). When the telephone 14 is set to an off-hook state, there flows a current between two wires 16a and 16b of the telephone line and hence the voltage therebetween is decreased. The detector 2a detects the voltage drop (step S2) to transmit off-hook information via the serial interface to the computer 8 (step S3).

Having recognized the off-hook state of the telephone 14 in accordance with the off-hook information, the application initiation request unit 9 of the computer 8 initiates the telephone directory application software (step S4).

With provision of the unit 9 and the detector 2a above, when the user carries out a speech through an external telephone by use of a personal computer, the troublesome operation to detect the telephone application software and/or the telephone directory application becomes unnecessary software. It is not required for the user to be versed in the telephone application software connected to the personal computer. Additionally, after the directory is opened and the partner's call number is dialed, the speech is accomplished by the external telephone. Consequently, the personal computer is not solely dedicated to be used for speech, namely, it is possible to achieve another operation by the computer.

Referring now to FIG. 5, description will be given of the operation of the apparatus at call termination. When a bell signal is received from the network 1, the external telephone 14 rings (step S1). At the same time, the caller ID detector 6 detects under control of the line controller 2 information of a partner (caller information) having issued the telephone call and then notifies the information to the central control unit 7 (step S2). The central control unit 7 at once stores the caller information in the storage 7a.

The number of bell signals from the network 1 is counted (step S3) to determine whether or not the count value is equal to a predetermined value (step S4). If this is the case, the line controller 2 automatically closes the telephone line (step S5) and then a current flows between two wires of the telephone line to lower the voltage therebetween.

Having detected the voltage drop, the off-hook detector 2a sends off-hook information via the serial interface to the computer 8 (step S6).

Moreover, the information including the partner's telephone number and the like which has been notified from the network 1 and which has been stored in the storage 7a as described above is also sent via the PC interface 4 to the computer 8 (step S7).

The application initiation request unit 9 continuously monitors the serial interface of the computer 8 to receive an off-hook event from the off-hook detector 2a. On receiving the event (step S8), the unit 9 of the computer 8 invokes the directory application software in accordance with the off-hook information (step S9).